

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>WO 33191</b>	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. <b>PCT/IB 2002/002181</b>	International filing date (day/month/year) <b>13.06.2002</b>	Priority date (day/month/year)
International Patent Classification (IPC) or national classification and IPC <b>H04Q 7/38, H04B 7/005</b>		
Applicant <b>Nokia Corporation et al</b>		

  

1.	This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.
3.	This report is also accompanied by ANNEXES, comprising: <div style="margin-left: 20px;">           a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>6</u> sheets, as follows:           <div style="margin-left: 20px;"> <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).  <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.           </div> </div> <div style="margin-left: 20px;">           b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).         </div>
4.	This report contains indications relating to the following items: <div style="margin-left: 20px;"> <input checked="" type="checkbox"/> Box No. I      Basis of the report  <input type="checkbox"/> Box No. II     Priority  <input checked="" type="checkbox"/> Box No. III    Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  <input type="checkbox"/> Box No. IV    Lack of unity of invention  <input checked="" type="checkbox"/> Box No. V     Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement  <input type="checkbox"/> Box No. VI    Certain documents cited  <input type="checkbox"/> Box No. VII   Certain defects in the international application  <input type="checkbox"/> Box No. VIII   Certain observations on the international application         </div>

  

Date of submission of the demand  <b>13.01.2004</b>	Date of completion of this report  <b>13.09.2004</b>
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer  <b>Åsa Rydenius /OGU</b> Telephone No. +46 8 782 25 00

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))  
☐ publication of the international application (under Rule 12.4)  
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

☐ the international application as originally filed/furnished

☒ the description:

pages 1 - 15 as originally filed/furnished

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☒ the claims:

pages \_\_\_\_\_ as originally filed/furnished

pages\* \_\_\_\_\_ as amended (together with any statement) under Article 19

pages\* 1 - 6 received by this Authority on 06 . 05 . 2004

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☒ the drawings:

pages 1 - 4 as originally filed/furnished

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (*specify*): \_\_\_\_\_

☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (*specify*): \_\_\_\_\_

☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application
- ☒ claims Nos. 1-19 in part

because:

- ☐ the said international application, or the said claims Nos. \_\_\_\_\_  
relate to the following subject matter which does not require an international preliminary examination (*specify*):

- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. \_\_\_\_\_  
are so unclear that no meaningful opinion could be formed (*specify*):

- ☐ the claims, or said claims Nos. \_\_\_\_\_ are so inadequately supported  
by the description that no meaningful opinion could be formed.

- ☒ no international search report has been established for said claims Nos. 1-19 in part

- ☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the  
Administrative Instructions in that:

the written form

☐

has not been furnished

☐

does not comply with the standard

the computer readable form

☐

has not been furnished

☐

does not comply with the standard

- ☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with  
the technical requirements provided for in the Annex C-bis of the Administrative Instructions.

- ☒ See Supplemental Box for further details.

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX III.

The original independent claims 1, 11 and 21 provided for a large number of possible methods and systems and the international search were therefore only carried out for certain parts of these claims. After amendment of the claims (2004-05-06), said original claims 1, 11 and 21 remain as part of the new claims 1, 10 and 19. Therefore, this report is only valid for the parts of the present claims 1, 10 and 19, which were included in the international search report.

**Motivation from the international search report:**

"The present claims 1, 11 and 21 provide for a large number of possible methods and systems. These possibilities differ widely within the area and the description fails to support all possibilities. In fact, the claims contain so many options that a lack of clarity and conciseness within the meaning of Article 6 PCT arises to such an extent as to render a meaningful search of the claims impossible.

Consequently, the search has only been carried out for those parts of claims 1, 11 and 21, which appear to be supported and disclosed, namely a method and a system for adaptive resource allocation of a physical shared channel by adjusting power or spreading factor."

**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-19</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-19</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-19</u>	YES
	Claims		NO

**2. Citations and explanations (Rule 70.7)****Documents cited in the International Search Report:**

D1: EP1209936 A

D2: WO0245291 A

D3: "Packet service in UMTS: delay-throughput performance of the downlink shared channel" (Borgonovo et al, ISSN: 1389-1286)

D4: EP1035676 A

The cited documents represent the general state of the art.

The invention defined in claims 1-19 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method and system for adaptive resource allocation of a physical shared channel by adjusting power or spreading factor. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-19 is novel and is considered to involve an inventive step. The invention is industrially applicable.

Please note that this report is only valid for claims 1-19 in part - see box III for further information

Enclosure of May 6, 2004

PCT-Application No.: PCT/IB2002/002181

Applicant: Nokia Corporation

Our ref.: WO 33191

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### CLAIMS

10 1. A method for adaptive setting or reservation of  
channelization codes and/or power for downlink channel in a  
communication network, using parameters ( $SF_{min}$ ,  $P_{txDSCHallowed}$ )  
for minimum allowed Spreading Factor, SF, and/or allowed  
power level, the parameters being set depending on the  
15 traffic load, the total cell load and/or the availability of  
channelization codes, wherein three kinds of measurements are  
performed:

1. Average transmitted power of a physical shared  
downlink channel, PDSCH,

20 2. Relative activity factor, A, of the PDSCH, and

3. Weighted code blocking rate, B,

and adaptive adjustment of root spreading factor and power is  
based on these three kinds of measurements.

25 2. The method of claim 1, wherein a criteria for  
adjustment of the allowed power level is:

if A is smaller than  $TH_{A1}$ , and  $P_{txDSCHest}$  is smaller  
than  $(P_{txPDSCHallowed} - X)$ , then decrease the reserved power,  
preferably by X or a fraction thereof,

30 A representing an activity factor of the downlink channel,  
 $TH_{A1}$  a threshold parameter,  $P_{txDSCHest}$  the estimated power of  
the downlink channel,  $P_{txPDSCHallowed}$  the power allowed for the  
downlink channel, and X a certain set value.

6 -05- 2004

3. The method of claim 1, or 2, wherein a criteria for adjustment of the allowed power level is:

if  $A$  is greater than  $TH_{A2}$ , and  $P_{txDSChest}$  is greater than  $(P_{txPDSCallowed} - X)$ , then increase the allowed power by  $X$ ,  
5  $A$  representing an activity factor of the downlink channel,  $TH_{A2}$  a threshold parameter,  $P_{txDSChest}$  the estimated power of the downlink channel,  $P_{txPDSCallowed}$  the power allowed for the downlink channel, and  $X$  a certain set value.

10 4. The method of any one of the preceding claims, wherein a criteria for adjustment of the minimum spreading factor,  $SF_{min}$ , is:

if  $B$  is greater than  $TH_B$ , and  $A$  is greater than  $TH_{A2}$ , then decrease  $SF_{min}$  (allow higher bit rates),

15  $B$  representing a weighted code-blocking rate,  $A$  an activity factor of the downlink channel, and  $TH_B$  and  $TH_{A2}$  threshold values.

20 5. The method of any one of the preceding claims, wherein a criteria for adjustment of the minimum spreading factor,  $SF_{min}$ , is:

if  $B = 0$  (zero), and  $L_{code}$  is greater than  $TH_{code}$ , then increase  $SF_{min}$  (maximum bit rate is decreased),

25  $B$  representing a weighted code-blocking rate,  $L_{code}$  a current load of a code tree, and  $TH_{code}$  a threshold parameter.

6. The method of any one of the preceding claims, wherein a method for channelization code allocation comprises a step of reserving a new root code with a given spreading  
30 factor (Spreading Factor), and a subsequent step of deciding where in a code tree this reservation is to be made.

7. The method of claim 6, wherein codes for downlink

basically are assigned in the code tree starting from a certain limb of the code tree, and codes are assigned for users primarily in another limb of the code tree.

5           8. The method of claim 6 or 7, wherein a default capacity is allocated to a territory, e.g. DSCH territory to be used by HS-DSCH and DSCH, when the total code tree load allows this, wherein spreading factor SF is only increased if the code tree is highly loaded.

10           9. The method of any one of the preceding claims, wherein total cell load is measured by power.

15           10. A system for adaptive setting or reservation of channelization codes and/or power for downlink channel in a communication network, using parameters ( $P_{txDSCHallowed}$ ,  $SF_{min}$ ) for minimum allowed Spreading Factor, SF, and/or allowed power level, the parameters being set depending on the traffic load, the total cell load and/or the availability of  
20 channelization codes,

wherein the system is adapted to perform three kinds of measurements:

1. Average transmitted power of a physical shared downlink channel, PDSCH,

25           2. Relative activity factor, A, of the PDSCH, and

3. Weighted code blocking rate, B,  
and to base adaptive adjustment of root spreading factor and power on these three kinds of measurements.

30           11. The system of claim 10, wherein a criteria for adjustment of the allowed power level is:

if A is smaller than  $TH_{A1}$ , and  $P_{txDSCHest}$  is smaller than  $(P_{txPDSCHallowed} - X)$ , then decrease the reserved power,



preferably by  $X$  or a fraction thereof,

$A$  representing an activity factor of the downlink channel,  
 $TH_{A1}$  a threshold parameter,  $P_{txDSCHeSt}$  the estimated power of  
the downlink channel,  $P_{txPDSCHallowed}$  the power allowed for the  
5 downlink channel, and  $X$  a certain set value.

12. The system of claim 10, wherein a criteria for  
adjustment of the allowed power level is:

if  $A$  is greater than  $TH_{A2}$ , and  $P_{txDSCHeSt}$  is greater  
10 than  $(P_{txPDSCHallowed} - X)$ , then increase the allowed power by  $X$ ,  
 $A$  representing an activity factor of the downlink channel,  
 $TH_{A2}$  a threshold parameter,  $P_{txDSCHeSt}$  the estimated power of  
the downlink channel,  $P_{txPDSCHallowed}$  the power allowed for the  
downlink channel, and  $X$  a certain set value.

15

13. The system of any one of the preceding system  
claims, wherein a criteria for adjustment of the minimum  
spreading factor,  $SF_{min}$ , is:

if  $B$  is greater than  $TH_B$ , and  $A$  is greater than  
20  $TH_{A2}$ , then decrease  $SF_{min}$  (allow higher bit rates),  
 $B$  representing a weighted code-blocking rate,  $A$  an activity  
factor of the downlink channel, and  $TH_B$  and  $TH_{A2}$  threshold  
values.

25 14. The system of any one of the preceding system  
claims, wherein a criteria for adjustment of the minimum  
spreading factor,  $SF_{min}$ , is:

if  $B = 0$  (zero), and  $L_{code}$  is greater than  $TH_{code}$ ,  
then increase  $SF_{min}$  (maximum bit rate is decreased),  
30  $B$  representing a weighted code-blocking rate,  $L_{code}$  a current  
load of a code tree, and  $TH_{code}$  a threshold parameter.

15. The system of any one of the preceding system

claims, wherein a method for channelization code allocation comprises a step of reserving a new root code with a given spreading factor SF, and a subsequent step of deciding where in a code tree this reservation is to be made.

5

16. The system of claim 15, wherein codes for downlink basically are assigned in the code tree starting from a certain limb of the code tree, and codes are assigned for users primarily in another limb of the code tree.

10

17. The system of claim 15 or 16, wherein a default capacity is allocated to a territory, e.g. DSCH territory to be used by HS-DSCH and DSCH, when the total code tree load allows this, wherein spreading factor SF is only increased if the code tree is highly loaded.

15

18. The system of any one of the preceding system claims, being adapted to measure the total cell load by measuring power.

20

19. A network entity, preferably to be used in a method as defined in any one of the preceding method claims, or in a system as defined in any one of the preceding system claims, for adaptive setting or reservation of channelization codes and/or power for downlink channel in a communication network, in particular for downlink shared channel, DSCH, and high speed downlink shared channel, HS-DSCH, using parameters ( $P_{txDSCHallowed}$ ,  $SF_{min}$ ) for minimum allowed Spreading Factor, SF, and/or allowed power level, the parameters being set depending on the traffic load, the total cell load and/or the availability of channelization codes,

25

30

wherein the entity is adapted to perform three kinds of measurements:

1. Average transmitted power of a physical shared downlink channel, PDSCH,
  2. Relative activity factor,  $A$ , of the PDSCH, and
  3. Weighted code blocking rate,  $B$ ,
- 5 and to base adaptive adjustment of root spreading factor and power on these three kinds of measurements.

## CLAIMS

1. A method for adaptive setting or reservation of  
5 channelization codes and/or power for downlink channel in a  
communication network, , using parameters ( $SF_{min}$ ,  $P_{txDSCHallowed}$ )  
for minimum allowed Spreading Factor, SF, and/or allowed  
power level, the parameters being set depending on the  
traffic load, the total cell load and/or the availability of  
10 channelization codes.

2. The method of claim 1, wherein three kinds of  
measurements are performed:

1. Average transmitted power of a physical shared  
15 downlink channel (PDSCH),

2. Relative activity factor A of the PDSCH,

3. Weighted code blocking rate B,

and adaptive adjustment of root spreading factor and power is  
based on these three kinds of measurements.

20

3. The method of claim 1 or 2, wherein a criteria  
for adjustment of the allowed power level is:

if A is smaller than  $TH_{A1}$ , and  $P_{txDSCHest}$  is smaller  
than  $(P_{txPDSCHallowed} - X)$ , then decrease the reserved power,  
25 preferably by X or a fraction thereof,

A representing an activity factor of the downlink channel,  
 $TH_{A1}$  a threshold parameter,  $P_{txDSCHest}$  the estimated power of  
the downlink channel,  $P_{txPDSCHallowed}$  the power allowed for the  
downlink channel, and X a certain set value.

30

4. The method of claim 1, 2, or 3, wherein a  
criteria for adjustment of the allowed power level is:

if A is greater than  $TH_{A2}$ , and  $P_{txDSCHest}$  is greater

than  $(P_{txPDSCHallowed} - X)$ , then increase the allowed power by  $X$ ,  
A representing an activity factor of the downlink channel,  
 $TH_{A2}$  a threshold parameter,  $P_{txDSCHeSt}$  the estimated power of  
the downlink channel,  $P_{txPDSCHallowed}$  the power allowed for the  
5 downlink channel, and  $X$  a certain set value.

5. The method of any one of the preceding claims,  
wherein a criteria for adjustment of the minimum spreading  
factor,  $SF_{min}$ , is:

10 if  $B$  is greater than  $TH_B$ , and  $A$  is greater than  
 $TH_{A2}$ , then decrease  $SF_{min}$  (allow higher bit rates),  
 $B$  representing a weighted code-blocking rate,  $A$  an activity  
factor of the downlink channel, and  $TH_B$  and  $TH_{A2}$  threshold  
values.

15

6. The method of any one of the preceding claims,  
wherein a criteria for adjustment of the minimum spreading  
factor,  $SF_{min}$ , is:

if  $B = 0$  (zero), and  $L_{code}$  is greater than  $TH_{code}$ ,  
20 then increase  $SF_{min}$  (maximum bit rate is decreased),  
 $B$  representing a weighted code-blocking rate,  $L_{code}$  a current  
load of a code tree, and  $TH_{code}$  a threshold parameter.

7. The method of any one of the preceding claims,  
25 wherein a method for channelization code allocation comprises  
a step of reserving a new root code with a given spreading  
factor (Spreading Factor), and a subsequent step of deciding  
where in a code tree this reservation is to be made.

30 8. The method of claim 7, wherein codes for downlink  
basically are assigned in the code tree starting from a  
certain limb of the code tree, and codes are assigned for  
users primarily in another limb of the code tree.

9. The method of claim 7 or 8, wherein a default capacity is allocated to a territory, e.g. DSCH territory to be used by HS-DSCH and DSCH, when the total code tree load  
5 allows this, wherein spreading factor SF is only increased if the code tree is highly loaded.

10. The method of any one of the preceding claims, wherein total cell load is measured by power.

10

11. A system for adaptive setting or reservation of channelization codes and/or power for downlink channel in a communication network, using parameters ( $P_{txDSCHallowed}$ ,  $SF_{min}$ ) for minimum allowed Spreading Factor, SF, and/or allowed  
15 power level, the parameters being set depending on the traffic load, the total cell load and/or the availability of channelization codes.

12. The system of claim 11, being adapted to perform  
20 three kinds of measurements:

1. Average transmitted power of a physical shared downlink channel (PDSCH),
2. Relative activity factor A of the PDSCH,
3. Weighted code blocking rate B,

25 and to base adaptive adjustment of root spreading factor and power on these three kinds of measurements.

13. The system of claim 11 or 12, wherein a criteria for adjustment of the allowed power level is:

30 if A is smaller than  $TH_{A1}$ , and  $P_{txDSCHest}$  is smaller than  $(P_{txPDSCHallowed} - X)$ , then decrease the reserved power, preferably by X or a fraction thereof,  
A representing an activity factor of the downlink channel,

$TH_{A1}$  a threshold parameter,  $P_{txDSChest}$  the estimated power of the downlink channel,  $P_{txPDSCHallowed}$  the power allowed for the downlink channel, and  $X$  a certain set value.

5           14. The system of claim 11 or 12, wherein a criteria for adjustment of the allowed power level is:

          if  $A$  is greater than  $TH_{A2}$ , and  $P_{txDSChest}$  is greater than  $(P_{txPDSCHallowed} - X)$ , then increase the allowed power by  $X$ ,  $A$  representing an activity factor of the downlink channel,  
10    $TH_{A2}$  a threshold parameter,  $P_{txDSChest}$  the estimated power of the downlink channel,  $P_{txPDSCHallowed}$  the power allowed for the downlink channel, and  $X$  a certain set value.

          15. The system of any one of the preceding system  
15   claims, wherein a criteria for adjustment of the minimum spreading factor,  $SF_{min}$ , is:

          if  $B$  is greater than  $TH_B$ , and  $A$  is greater than  $TH_{A2}$ , then decrease  $SF_{min}$  (allow higher bit rates),  
           $B$  representing a weighted code-blocking rate,  $A$  an activity  
20   factor of the downlink channel, and  $TH_B$  and  $TH_{A2}$  threshold values.

          16. The system of any one of the preceding system  
          claims, wherein a criteria for adjustment of the minimum  
25   spreading factor,  $SF_{min}$ , is:

          if  $B = 0$  (zero), and  $L_{code}$  is greater than  $TH_{code}$ ,  
          then increase  $SF_{min}$  (maximum bit rate is decreased),  
           $B$  representing a weighted code-blocking rate,  $L_{code}$  a current  
          load of a code tree, and  $TH_{code}$  a threshold parameter.

30

          17. The system of any one of the preceding system  
          claims, wherein a method for channelization code allocation  
          comprises a step of reserving a new root code with a given

spreading factor SF, and a subsequent step of deciding where in a code tree this reservation is to be made.

18. The system of claim 17, wherein codes for  
5 downlink basically are assigned in the code tree starting from a certain limb of the code tree, and codes are assigned for users primarily in another limb of the code tree.

19. The system of claim 17 or 18, wherein a default  
10 capacity is allocated to a territory, e.g. DSCH territory to be used by HS-DSCH and DSCH, when the total code tree load allows this, wherein spreading factor SF is only increased if the code tree is highly loaded.

15 20. The system of any one of the preceding system claims, being adapted to measure the total cell load by measuring power.

21. A network entity, preferably to be used in a  
20 method as defined in any one of the preceding method claims, or in a system as defined in any one of the preceding system claims, for adaptive setting or reservation of channelization codes and/or power for downlink channel in a communication network, in particular for DSCH and HS-DSCH, using parameters  
25 ( $P_{txDSCHallowed}$ ,  $SF_{min}$ ) for minimum allowed Spreading Factor, SF, and/or allowed power level, the parameters being set depending on the traffic load, the total cell load and/or the availability of channelization codes.